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## ABSTRACT

This examination of the use of local area networks (LANs) by libraries summarizes the findings of a nationwide survey of 600 libraries and information centers and 200 microcomputer networking system manufacturers and vendors, which was conducted to determine the relevance of currently available networking systems for library and information center use. LANs and their components are described, and the role of microcomputers in LAN development is considered. The results of the study are provided together with a sample list of libraries and information centers that currently use LANS. (EW)

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## LOCAL AREA NETWORKS FOR INFORMATION RETRIEVAL

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**Keywords:** Local Area Networks, LANs, Online Information Retrieval, Inform-  
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 mation.

**Abstract:** Information professionals in libraries and information centers are gradually realizing the importance of local area networks in their daily activities. Microcomputers have pervaded all aspects of information work and networking them for optimum effectiveness has become inevitable. The local area network is thus a logical outcome of the micro proliferation to facilitate resource sharing. This paper presents a summary of the findings of a nation-wide research study on local area networks. It was sponsored by the City University of New York (CUNY) Research Foundation and conducted from July 1986 to December 1987. The purpose of the project was to evaluate the relevance of currently available networking systems for use in libraries and information centers. A sample of 600 United States libraries and information centers was randomly selected. In addition, another sample of 200 local area network products manufacturers and vendors was similarly selected. Investigation was done by questionnaires, interviews, and systems demonstrations. Results indicated that data sharing, electronic mail, uploading and downloading, device sharing, and software sharing are the most significant reasons for using local area networks in libraries and information centers.

## 1. INTRODUCTION

The value of information in society is at a premium. Today individuals and organizations have realized this fact and buy or sell information extensively as a marketable commodity. It is thus not only pertinent but mandatory for information professionals to discuss ways of optimizing it. Although they are relatively new, local area networks have a high potential for helping professionals to attain this goal.

This paper discusses local area networks as catalysts in the society's effort to access online information. It summarizes the results of a nation-wide study of these computer structures in American libraries and information centers. The online revolution which has been around for more than two decades, has pervaded the office, the library, the school, the factory, and the home. Local area networks are adding a very important dimension to it.

## 2. WHAT IS A LOCAL AREA NETWORK?

Several definitions of the term local area network abound in computer and information science literature. Some are too long or too brief to be adopted as working definitions. For the purposes of this paper a local area network (or LAN) is defined as a privately owned communications facility

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which links devices in a small area<sup>(1)</sup>. There are four basic elements in this definition which require further explanation.

First, a LAN must be fully owned and operated privately by the organization which initiated and continue to fund its activities. In other words, the communication links belong to the parent organization as opposed to other networks where links or lines are provided by common carriers like AT&T, Western Union or local telephone companies. Thus this distinction separates LANs from the networks based on large time sharing systems.

Second, it is a communications facility permitting devices to exchange information. It is not a computer network whereby a group of subordinate devices are hard wired or otherwise connected to a central processor or a cluster of processors. Several of the components of a LAN must have independent intelligence and processing power. Some information professionals discuss LANs as if they are limited to data. Although they are currently predominantly data communications facilities, systems are being developed to transmit:

- (a) Data - conventional computer generated messages.
- (b) Video images--like still picture frames, as well as moving images.
- (c) Audio messages--the spoken and machine generated signals.
- (d) Facsimile--replicas of graphic/written representations.

Multi-media LANs are at an advanced experimental stage and will soon be commercially available.

Third, a LAN links devices. A device linked in a local area network must be able to communicate to at least one other device on the network. The wide range of devices may include:

- (a) Central processors (CPU/computers)
- (b) Command and control systems (security, weather, etc.)
- (c) Dumb/intelligent terminals
- (d) Fax systems (Facsimile)
- (e) Interactive video
- (f) Other peripheral devices (disks, tapes, etc.)
- (g) PBXs (telephones/voice)
- (h) Transceivers (message transmitters and receivers)

Devices linked by a LAN may be from the same manufacturer say Apple Computers, AT&T and IBM. From the user's point of view, the more diverse the devices a given LAN can support the higher the utility value. The CUNY study discussed at the end of this paper revealed that most institutions have a variety of microcomputer brands in place. A LAN that permits multi-vendor devices to share data is definitely at higher premium than a single vendor based LAN.

Finally, a LAN is a facility for a small area. This results in ease of management, relative ease of use, and ownership by a single institution, division or department. It does not have to be in one building as suggested by some information professionals, for LANs have been successfully implemented in two or more buildings especially on college campuses or among research laboratories. The extremities or the furthest nodes should not be more than 2 kilometers (approximately one mile) apart. Beyond that it might be better to use other terms like metropolitan area networks (MANs) or wide area networks (WANs). These limitations in the definition also relate to the main components of LANs, the microcomputer.

### 3. LAN COMPONENTS

Several pieces are connected together to make a LAN. Any LAN must have at least five elements: the cabling system, workstations, servers, interface units and network software. Depending on the size and configuration of the LAN, the number of the elements may vary. A brief explanation of the elements will indicate their relationships starting with the cabling system. The function of the cabling system is to physically interconnect devices to facilitate the flow of messages among them. There are three generic systems

for cabling, coaxial cable, optic fiber and twisted pair wire. When packaged and marketed by different corporations, they may bear proprietary trademarks or brand names. Their characteristics are discussed in a later section.

Workstations form part of the intelligence of the LAN. They are the microcomputers (or personal computers) which are used to access, manipulate data or otherwise aid the end-user to perform his or her activities. They may be used as stand-alone or as LAN access devices. Depending on the user's choice or sometimes dictated by circumstances, they may be from one vendor or multiple vendors. As demonstrated by the CUNY study very few current or potential users of LANs start with a clean slate. The average institution has at least two or more brands of microcomputers before installing a LAN. Consequently, vendors providing protocol conversion, thus permitting use of multiple vendor workstations, would be more attractive to most users.

The third element is composed of servers. These are also microcomputers which facilitate access to shared resources for example a user from workstation X requiring that a file be printed on laser printer D will make the request through printer server W. For each shared device or set of devices, an associated server must be contacted before use. Some systems have independent servers, while others allocate server function to some of the workstations. There may be savings on the hardware in the latter case. However, the efficiency of the server as a workstation may be marred by the additional activity. Decision to have independent servers or use workstations depends on the level of financing available as well as the volume and range of services provided by the LAN.

The last hardware element is composed of interface units. They allow the logical connections to be made between the communicating devices. LAN vendors have various ways of implementing this. Some have circuit boards added to the microcomputer to transform it into a network station. Others have circuits incorporated in a separate box to which one or more micros may be connected.

LAN software is the final element to consider. Like any other computer system a LAN needs software to run and perform all the functions it is designed for. Three types of software are used, the systems software, the network software and the applications software. The systems software manages the hardware and permits other software to operate using the host hardware, examples would be the network versions of the DOS or UNIX. The network software, on the other hand, allows the interconnections between applications and the network. Common systems are Novells Netware and IBMs NETBIOS. The third component, the applications software covers the LAN versions of the ordinary software packages like dBase III, Lotus 1-2-3, Wordperfect and the like.

#### 4. TOPOLOGIES AND TRANSMISSION MEDIA

Local area networks are characterized by three basic topologies or configurations namely: The star, the bus/tree and ring (2). These topologies are demonstrated in figure X. A star is a group of connected devices (nodes) served by a central device sometimes referred to as a host (computer). On the other hand, a bus/tree topology has a multiple-access, broadcast medium. Since all devices share a common communication medium, only one device can transmit at a time. As figure X indicates, the bus is the special case of the tree with only one trunk. Finally, the ring consists of a closed loop with each node attached to a repeating element.

Another important feature of networks is the transmission media. Surveying current literature reveals that there are three types of media suitable for networks, the twisted pair wire, coaxial cable and optical fiber. The twisted pair wire is one of the common transmission media. It's main weakness is that it is susceptible to noise. However, with proper shielding this defect can be minimized. Coaxial cable can achieve higher

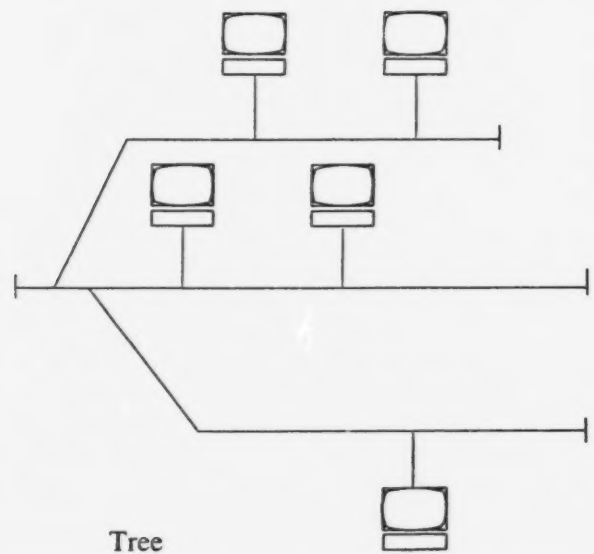
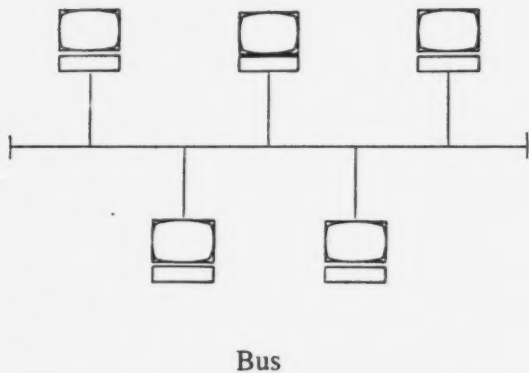
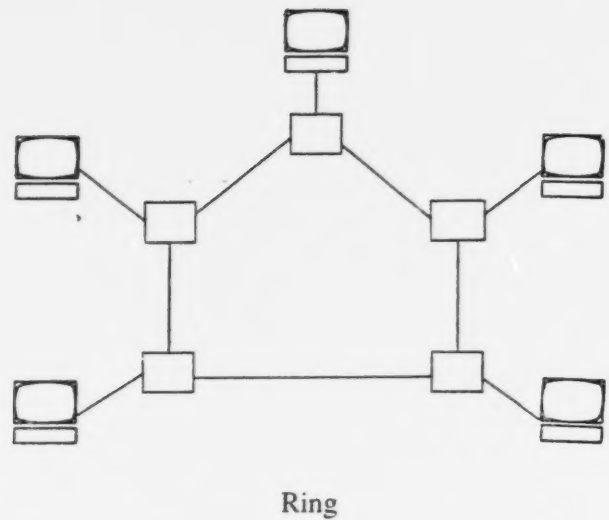
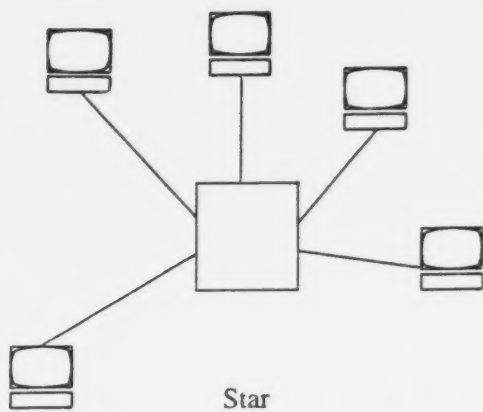


Figure X. Local area network topologies.

performance by providing higher throughput, supporting a larger number of devices and spanning greater distances than twisted pair wire. Although it is very expensive, optical fiber has even higher potential, for it carries a larger number of devices, has light weight, small diameter and is more resistant to noise than the other two.

It is important to note that choices of transmission medium and topology can not be done independently. For instance, twisted pair wire is more suited to the star topology than coaxial cable or optical fiber. This is due to the fact that the star topology requires a single point to point link between each device and a central switch. The higher data rates of coaxial cable or optical fiber would overwhelm the switches available with today's technology.

## 5. THE ROLE OF MICROCOMPUTERS IN LAN DEVELOPMENT

The microcomputer (or personal computer) has pervaded all aspects of life in industrialized countries. Today one finds micros in the school room, on college campuses, corporate office, research laboratories and public libraries where they are provided free for patron use. When they were introduced in the early 1970s, micros were not taken seriously by information professionals. They were relegated to hobbyists ventures. Large reputable computer manufacturers were initially not interested until Apple Computer Corporation built easy to use commercially available Apple II series in the late 1970s. Realizing that the micro market was rapidly expanding the computer giant, Big Blue joined the gang in 1981 with its IBM PC. The microcomputer has continued to be popular among the traditionally non-computer experts. Their increasing domination of the layman's computing arena is a result the micros highly desirable characteristics compared to mini or mainframe computers.

First, the micro has so far proved to be more versatile than any other computer on the market. It has been used for entertainment, from playing computer games to accessing electronic bulletin boards. Education in general has been promoted by a multitude of programs developed on the microcomputer. Every facet of the work place is currently enhanced by micro based applications. In fact, there are very few areas of human society, if any, which have not been touched by the power of the micro.

Second, the microcomputer is characterized by simplicity which in computerese translates into user-friendliness. The age of the mainframe computer was very intimidating to the layman. Introducing minicomputers in the 1960s somewhat reduced the level of intimidation, nevertheless, the end-user was still served via a middleman, the computer consultant. The advent of the micro ended the log on procedures and computing power became instantly available to whoever had access to it. In addition, both systems and application programs became easier to master and use. In other words, it revolutionized the computing environment for the layman.

Third, the micro is extremely portable in contrast to other computers. It may be placed on the desk top; put on ones lap while sitting on a bus, a subway or even on the plane; and may easily be moved from one office to another within an organization. The use of diskettes makes sharing of simple data and software relatively easy contrasted to mini or mainframe operations. One must, however, stress the fact that software portability is in this case limited to microcomputer systems with compatible hardware and of course software.

Fourth, availability of abundant systems and applications software has characterized the micro market. The end-user of micros has been blessed by the enthusiasm with which software houses have developed appropriate software. Several types of new or revised editions are unveiled every day. The user's major problem lies in identifying software appropriate for his or her application. For common applications, it is imprudent to start inhouse soft-

ware development without surveying the market, because the chances are one or more packages have already been marketed. If not completely appropriate, the existing software may need minor modifications, which makes it more cost-effective than starting from scratch.

Finally, another desirable characteristics of micros is the gradual upward growth into the mini and mainframe turf. The performance of the top of the line super micro like IBM PS/2 model 80 or some of Data Generals 32 bit super micros is higher than the lower end mini or mainframe, for instance the IBM 360s or Digital Equipment Corporations PDP 11 series. One may wonder how and why has this been possible. The answer partly lies in the evolvement of computer technology.

### 5.1 Underlying Technology

Microcomputer upward migration has come as a result of relatively recent developments in computer hardware and software, particularly in the 1970s and early 1980s. Computer circuit designers have successfully experimented with large scale integrated circuits (LSI) and later very large scale integrated circuits (VLSI)(3). Using LSI and VLSI technology, it is possible to compress more electronic circuits on a single silicon chip. These high density chips are used in creating microprocessors. Such microprocessors are in turn used as the building blocks for microcomputers and associated devices.

LSI and VLSI technology based devices are characterized by smaller sizes, large memories and faster response times. The tendency to miniaturize computer components which have more power is clearly manifest in the microcomputer memories. The earlier micros had main memories of 8K as standard memories. Memories have advanced to 64K, 128K, 256K and 512K. Megabyte (million bytes) memories are now standard for super micros. Word sizes have likewise progressively increased from 8-bit, through 16-bit to currently 32-bit for the super micros.

Concurrent improvement of microcomputer hardware and software has resulted in the marketing of sophisticated software packages. Such packages can perform a multitude of functions like accounting, word processing, data base management and communications. Due to the size of their memories, earlier microcomputers could not accommodate some of the modern packages. For instance Wordperfect which needs a minimum of 256K of main memory could not be used on earlier microcomputers. Similarly, Lotus 1-2-3 which requires a minimum of 128K of memory could not be used on some of the early micros.

### 5.2 Influence on Usage

Usage patterns for end-users have been greatly influenced by the increasing sophistication of the micro. When micros infiltrated individual offices in the early and mid 1980s, they were used mainly for relatively simple tasks like word processing and accounting. A number of developments have occurred on the user scene since then. First, the simple micro has become a very sophisticated indispensable workstation in the work place. This is true in business and industrial environments, academic settings and libraries or information centers of all types. As the information appetite of desk top computer users get sharper, they realize that they must access common data banks locally or outside their institution. Inevitably several modems must be purchased as well as taking subscriptions to interstate, national or international communications vendors.

Second, to the information systems manager in organization X, what was initially applauded as desirable distributed processing becomes an insurmountable problem. Not only are users demanding access to common data, they also demand easy access to expensive devices like high quality printers and winchester storage systems. At the same time, some users may have under-

utilized disk space and communication devices. Thus on some sites, there may be a lot of computing power, and yet it may appear to be inadequate to some users.

Finally, the LAN has come to the rescue to ameliorate both the user and information manager's problems. The LAN satisfies both the end-users need for independence and the information managers desire for co-ordination. The user can have proprietary files and at the same share common data and expensive peripherals(4). Similarly, the information systems manager will ensure that common data is not contaminated by unauthorized modification thus maintaining high data integrity. It may be safely said that the LAN is the logical by-product of microcomputer proliferation in organizations.

## 6. LANs AND THE ONLINE CONCEPT

Whereas the term online is commonly used in data processing, it attains a special connotation when used in libraries and information centers. Traditionally, information centers and libraries used hard copy resources to satisfy the basic information needs of most organizations. With the development of data banks like DIALOG, BRS, SDC and the Source, the librarian can bypass the conventional sources and obtain information instantly. Similarly, the creation of organizations like Online Computer Library Center (OCLC), Research Libraries Information Network (RLIN) and the Washington Library Network (WLN) has resulted in the provision of computerized services which aid the librarian in providing information quickly to library patrons. The latter group of organizations are sometimes referred to as bibliographic utilities. The two most significant functions of bibliographic utilities are first to minimize original cataloging and processing of books by providing online standard bibliographic records which may be adopted by libraries. Second, by maintaining online library holdings at regional and national levels, they facilitate easy and speedy routing of inter library loan requests.

Many other internal library functions have been improved by computerization. The earliest library function to computerize was the item check out (or circulation) system. With this system, an item may be checked out quickly without either the library staff member or patron filling out check out forms. If necessary, a librarian can review online items checked out to see who has what and when it is due back in case some one else desires to use the same item. One of the most fascinating areas of library automation is the computerization of the catalog. In a number of libraries, the traditional card catalog has been replaced by an online public access catalog (OPAC). Using a computer terminal patrons can access the catalog online via author, subject or other access point.

Online is changing the way librarians and other information specialists do business. The hard copy printed document is gradually ceasing to be the major source of information. This is particularly true of current information. Most information providers in corporate information centers and large research and academic libraries resort to the computer as the first resource to search when faced with user questions demanding very current information. Thus online has meant simplification of repetitive routines and enhancement of library services for the benefit of patrons.

Local area networks optimize the concept of online in several ways. First, they facilitate online sharing of expensive hardware like high quality laser printers, storage devices like hard disks, tapes and cassettes. Users are alternated among these devices using servers. Second, software can be shared online without physically transporting diskettes from one micro user to another, known in the popular press as the 'diskette derby.' In this case one LAN version of the software package is loaded on the server and may be accessed by any of the users on the LAN. Third, commonly used data can be conveniently shared online by microcomputers without going through larger

computers (minis or mainframes). This may be administrative data, such as staff files to be used by the library management group. It may also be the conventional catalog data to be used by both the public and library staff. It has been demonstrated in the United Kingdom that OPACs can be designed to run effectively on LANs (5).

Fourth, LANs are used for sharing communications devices especially high quality powerful modems. Depending on usage ratio, frequency of use and capacity, a set of modems can serve a group of users who must access outside data banks and bibliographic utilities. This is again implemented on a LAN through a communications device server. Complementary to this, data downloaded from a data bank or a bibliographic utility may be stored on a common access disk and later be searched, reformatted or otherwise manipulated by any of the devices attached to the LAN. Uploading is equally enhanced. Data created on different micros may be stored in a file, on a common disk. When all the refinements are done on the common file, any of the micros on the LAN may issue a command online to upload it into a cooperative bibliographic utility. Checks and safeguards can be built into the LAN design to maintain data file integrity.

Starting from the mid 1980s, the term professional workstation has been commonly used by information professionals to refer to powerful desktop microcomputers. It is a workstation because such a micro may be designed to manipulate most of the programs that a given professional requires to effectively perform his or her duties. Report writing, accessing data banks and communicating to other professionals can be done online using the workstation. The corporate executive office, the scientific laboratory as well as libraries and information centers achieve higher levels of productivity by using a workstation on a LAN. Economies are realized through online sharing of resources and file and data quality can be achieved through careful planning.

## 7. THE CUNY STUDY

This section of the paper presents a summary of results of a study of microcomputer networking systems in American libraries and information centers which stressed LANs. The aim of the nation-wide study was to evaluate the relevance of currently available systems for library use. There were two major aspects to the study. First, using a representative sample (600) of United States libraries and information centers, it was intended to access library need for microcomputer networking. This was done by a combination of questionnaire, interviews and site visits. Second, it was intended to investigate a broad representation (200) of microcomputer networking systems manufacturers/vendors to identify systems which can be adapted/adopted for library applications. This was done by questionnaire, interviews, site visits and demonstrations. Only four sites were visited for demonstrations. The study which was funded by the City University of New York (CUNY) started in July 1986 and ended in December 1987.

In pursuit of the two basic aspects of the study, the main focus was on the following objectives:

1. To identify the variety of microcomputers currently in use in libraries and information centers in the United States.
2. To identify functions and services which require microcomputer networking as perceived by librarians and other information specialists.
3. To identify which libraries and information centers already use microcomputer networking systems.
4. To identify what microcomputer networking systems, if any, are currently in use and for which functions.
5. To investigate the availability of in-house developed microcomputer networking systems. If such systems exist, are they available for purchase or lease to other libraries.

6. To identify advantages/pluses or disadvantages of using microcomputer networking systems as perceived by librarians and other information specialists.
7. To identify microcomputer networking systems which can be adopted/adapted for library applications.
8. To appraise cost estimates for the relevant systems.
9. To appraise software and hardware features required for the suitable systems.
10. To produce a comprehensive report which can be used by librarians and other information specialists in evaluation and selection of microcomputer networking systems.

## 7.1 Research Results

Tabulation of field data indicated a number of interesting tendencies as demonstrated in tables 1 and 2. What follows is a summary of the findings. A full report of the CUNY Study will be published by Greenwood Press in 1988 in a full length monograph on local area networks.

### 7.11 Rationale for Networking Microcomputers

Librarians and information specialists are very keen on LANs. They have expressed frustration that several of their microcomputers cannot communicate with each other. Those who can transmit messages using PBXs think that this is somewhat limited and see LANs as one of the logical alternatives. The following have been given as the main reasons for networking microcomputers (see rows 1-5 respectively):

- (1) To access common data, examples - online public access catalogs, acquisitions, and serials information.
- (2) To share expensive devices, examples - hard disks, high quality printers.
- (3) To share software (program packages) examples - Word Processing, accounting, communications.
- (4) Electronic mail among departments and with patrons.
- (5) Uploading and downloading to and from other systems, examples - OCLC, RLIN, DIALOG, the Source.

With 95.5% of the respondents agreeing, the research indicated that online access to common data is the single most important reason for networking microcomputers. Sharing software had 78.1% consent level indicating caution with regard to copyright provisions.

### 7.12 Current Usage of LANs

As indicated by row 6, the number of libraries and information centers which are already using LANs is relatively small (18.6%) Of the institutions surveyed, there was a marked concentration among academic libraries and few public or special libraries. However, as indicated by row 7 45.4% of the sample have definite plans to use LANs. A considerable number of institutions are in the middle of negotiations with vendors.

Some of the current users in the sample were:

Allegheny General Hospital, Health Sciences Library (Pittsburgh, PA)  
 AT&T Bell Labs Information Center (NJ)  
 California Institute of Technology (CA)  
 Dow Chemical Company Information Center (MI)  
 Ford Motor Company Information Center (MI)  
 Georgetown University Medical Center (Washington, D.C.)  
 Humboldt State University (CA)  
 Lexington Public Library (KY)  
 Massachusetts Institute of Technology (MA)

|    |          |           |             |                         |                       |
|----|----------|-----------|-------------|-------------------------|-----------------------|
| 1. | ACCESS   | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 7         |             |                         |                       |
|    | N        | 16        | 4.5         | 16                      | 4.5                   |
|    | Y        | 341       | <u>95.5</u> | 357                     | 100.0                 |
| 2. | SHRDEV   | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 13        |             |                         |                       |
|    | N        | 77        | 21.9        | 77                      |                       |
|    | Y        | 274       | <u>78.1</u> | 351                     | 100.0                 |
| 3. | SHRSOFT  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 18        |             |                         |                       |
|    | N        | 84        | 24.3        | 84                      | 24.3                  |
|    | Y        | 262       | <u>75.7</u> | 346                     | 100.0                 |
| 4. | ELECMail | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 9         |             |                         |                       |
|    | N        | 52        | 14.6        | 52                      | 14.6                  |
|    | Y        | 303       | <u>85.4</u> | 355                     | 100.0                 |
| 5. | UPDNLOAD | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 10        |             |                         |                       |
|    | N        | 59        | 16.7        | 59                      | 16.7                  |
|    | Y        | 295       | <u>83.3</u> | 354                     | 100.0                 |
| 6. | PRESLAN  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|    |          | 4         |             |                         |                       |
|    | N        | 293       | 81.4        | 293                     | 81.4                  |
|    | Y        | 67        | <u>18.6</u> | 360                     | 100.0                 |

Table 1. Data Analysis I

|     |          |           |             |                         |                       |
|-----|----------|-----------|-------------|-------------------------|-----------------------|
| 7.  | LANPLANS | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 115       | .           | .                       | .                     |
|     | N        | 136       | 54.6        | 136                     | 54.6                  |
|     | Y        | 113       | <u>45.4</u> | 249                     | 100.0                 |
| 8.  | WANTREPT | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 15        | .           | .                       | .                     |
|     | N        | 74        | 21.2        | 74                      | 21.2                  |
|     | Y        | 275       | 78.8        | 349                     | 100.0                 |
| 9.  | TOO_EXP  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 337       | .           | .                       | .                     |
|     | Y        | 27        | 100.0       | 27                      | 100.0                 |
| 10. | TOO_NEW  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 354       | .           | .                       | .                     |
|     | Y        | 10        | 100.0       | 10                      | 100.0                 |
| 11. | NO_ASESS | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 278       | .           | .                       | .                     |
|     | Y        | 86        | 100.0       | 86                      | 100.0                 |
| 12. | OTH_OBJ  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 323       | .           | .                       | .                     |
|     | Y        | 41        | 100.0       | 41                      | 100.0                 |
| 13. | NOT_APP  | FREQUENCY | PERCENT     | CUMULATIVE<br>FREQUENCY | CUMULATIVE<br>PERCENT |
|     |          | 146       | .           | .                       | .                     |
|     | Y        | 218       | 100.0       | 218                     | 100.0                 |

Table 2. Data Analysis II

Monsato Company Information Center (MO)  
 New York University Library (N.Y.)  
 Northern Illinois Library System (IL)  
 Oregon State University (OR)  
 University of California, Los Angeles (CA)  
 University of California, San Diego (CA)  
 University of Kentucky (KY)  
 University of New Mexico (NM)  
 University of Virginia, Charlottesville (VA)

### 7.13 The Vendor Market

The market for LANs is in a state of flux and confusing. Whereas the potential for them in library automation is tremendous, the market has several sleek ads and aggressive salespeople. Extreme caution is needed to distinguish between genuine LANs products and products which vendors claim to be LANs but are in fact multi-user systems based on data switches.

As for the types of LANs currently in use in libraries/information centers, Ethernet appears to be the most popular so far. Most commonly cited vendors include: Corvus Systems, Nestar Systems, Novell, 3 COM and Ungermann-Bass. IBMs token-ring is receiving much attention due to the prestige of the vendor, but has relatively few installations. AT&Ts LANs are incorporated in campus-wide networking systems which are relatively few.

### 7.14 Current Problems

The basic problems center around the following:

- (a) Estimating the workload of the library/information center.
- (b) Designing the LAN, in collaboration with technical personnel.
- (c) Identifying suitable LAN software and hardware.
- (d) Selecting a reliable vendor.
- (e) Lack of standards among currently available LANs.
- (f) Maintaining data security after installation.

Some of the solutions to these problems, as revealed by the research findings, are discussed in detail in the Greenwood Press book mentioned earlier.

## 8. REFERENCES

1. Stallings, William. "Local Networks." Computing Surveys 16, No. 1, p. 4-5, March 1984.
2. Graube, Maris and Mulder, Michael C. "Local Area Networks." Computer 17, p. 243, October 1984.
3. Mead, Carver and Conway, Lynn. Introduction to VLSI Systems. Reading, Mass.: Addison-Wesley, 1980 1-50.
4. Puette, Robert. "Executive View of Microcomputers." Infosystems 33, No. 8, p. 28-30, 1986.
5. Mitev, Nathalie Nadia, et al., Designing an Online Public Access Catalogue: Okapi, a Catalogue on a Local Area Network. London: British Library, 1985.